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## (54) IMPROVEMENTS RELATING TO THE LUBRICATION OF TEXTILE MACHINES

(71) We, SULZER BROTHERS LIMITED, a Company organised under the laws of Switzerland, of Winterthur, Switzerland, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described, in and by the following statement:-

This invention relates to a method of lubricating a textile machine, e.g. a loom, and a lubricating system for performing the method.

It has already been proposed to take oil mist continuously from an oil mister and supply it to one or more lubricating stations of a textile machine. One of the disadvantages of this is that the lubricating device cannot provide a really small lubricating effect such as is required in textile machinery in order not to soil the textiles, e.g. the cloth. In operation, droplets of oil may form on the supply nozzles of the various lubricating stations and may soil the textile goods, such as the cloth.

According to one aspect the present invention provides a method of lubricating a textile machine, the method comprising delivering in a programmed sequence at a lubricating station of the machine lubricant-mist pulses and gas pulses, the gas pulses being introduced into a supply line conveying the lubricant-mist to the lubricating station, at a point downstream of a lubricant mister as considered in the direction of lubricant flow.

According to a second aspect of the present invention, a textile machine has a lubricating station, a lubricant-mist line leading from a lubricant mister to the lubricating station, a pressurised gas line leading into the lubricant-mist line at a point downstream of the lubricant mister as considered in the direction of lubricant flow, first and second flow control means controlling flow through the gas line and the lubricant-mist line respectively, and a program controller arranged to control the flow control means to deliver to the lubricating station lubricant-mist pulses and gas pulses in a programmed sequence.

By means of the invention it is possible to provide lubrication which is reliable and uniform and, as is often required for textiles, is at a low volume rate. The gas pulses (it will be assumed hereinafter that the gas is air) obviate condensation droplets of lubricant (which will be assumed hereinafter by way of example to be oil). Even after possibly lengthy interruptions in lubrication, it is unlikely that any oil droplets will reach the lubricating station upon resumption of lubrication, for the effect of the air pulses is that the residual oil mist in the feed line of a lubricating station is ejected before any condensation. Feed lines, spray nozzles and lubricating stations are cleaned continuously during the air pulses by the cleaning air and freed from surplus oil mist which might condense during interruptions in lubrication.

Preferably, suction pulses are produced in a programmed sequence at the lubricating station to remove the lubricant mist or dirt. These suction pulses continually remove any fluff or abraded metal from parts of the machine which may in operation settle near the lubricating station, and so soil of this nature cannot reach the textile product, e.g. cloth, produced by the machine.

As mentioned, oil consumption is low, a feature which has cost advantages and reduces environmental pollution.

The invention may be carried into practice in various ways but one textile machine lubrication system, its method of operation and its application to a loom will now be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a circuit diagram of the lubricating system operating by a method

according to the invention;

Figure 2 is a corresponding pressure diagram for one of the lubricating stations; and

Figures 3 and 4 show two lubricating stations of a loom.

The lubricating system shown in Figure 1 forms part of a loom; all that has been shown thereof are the parts which can be seen in Figures 3 and 4. A compressor 1 in the picking mechanism of the loom compresses air which is stored in an air tank 2 at a constant pressure which can be adjusted by means of a safety valve 4 and read on a pressure gauge 3. An air feed line 12 extends via a water separator 5, pressure controller 6, branch point 13 and two lines 12', 12" to two solenoid valves 7*a*, 7*b* connected in parallel with one another. Line 12' also extends by way of an oil mister 8 to a connecting point 14 and line 12" extends thereto directly; after the point 14 the line 12 continues as a single line to feed a number of parallel connected lubricating nozzles 9.

An oil mist 16 can issue from the nozzles 9 to places 17 requiring lubrication. An oil mist extractor line 18, indicated in chain lines, can be provided to enable oil mist to be extracted (suction pulses) from the station 17 under an identical or similar program.

The two valves 7*a*, 7*b* are connected via electric control lines 21 to an electronic programmer 10 which a speed-dependent pickoff 11 operated from the loom main shaft 22 synchronizes with the loom.

In operation the program in the programmer 10 acts by way of the valve 7*a* to produce relatively long oil mist pulses 23 (Figure 2) at a pressure of approximately 0.1 atmospheres gauge (atg). Each pulse is immediately followed by a much shorter air pulse 24, which may be termed a scavenging air pulse, at the higher pressure of 0.5 atg. The oil mist pulse is approximately four times as long as the scavenging air pulse. In the example being described an oil mist pulse followed by a scavenging air pulse occurs approximately after each 250 picks.

These oil mist and air pulses occur at all the lubricating stations 17 in parallel as shown in Figure 1.

Figure 3 shows by way of example three lubricating stations 17*a*, 17*b*, 17*c* in the casing 25 of the picking motion of the loom. Each lubricating station comprises a feed line 12*a*, *b*, *c* and a nozzle 9*a*, *b*, *c*. At station 17*a* an oil mist pulse and a scavenging air pulse are introduced through spray chambers 29 and 29*a* as the slide block 28 of a weft feeder and draw-back device (not shown) reciprocates perpendicularly to the plane of the drawing. Some of the oil mist impinges on an oppositely disposed surface 51 of each of the spray chambers and the relatively large oil particles collect on the surfaces 51. Together with the oil mist component which contains the relatively small oil particles and which is deflected in the spray chambers, the relatively large oil particles reach the surfaces 31, 31*a* to be lubricated between the block 28 and a stationary guide bar 32.

At the station 17*b*, as the projectile striker 33 of the picking motion reciprocates perpendicularly to the plane of the drawings, oil mist pulses and air scavenging air pulses are delivered to the nozzle 9*b*. When the striker 33 is in the position shown these pulses are directed against the surface 35 of the striker but when the nozzle orifice 36 is opened by the striker moving away from the vicinity of the nozzle the pulses are directed against the surface 34 of the striker guide.

Another lubricating station 17*c* is provided for the striker 33. The oil mist pulses and the scavenging air pulses passing through the nozzle 9*c* go through a spray chamber 37, which is in the plane of the drawing and which has an impingement surface 39, and through a spray chamber 37*a*, which is behind the plane of the drawings, to reach two lubricating surfaces 38, 41.

A passage 61 and associated ball valve 62 can be provided via which the oil mist can be extracted by suction pulses in an appropriate program sequence. The suction pulses can occur, for example, during the oil mist pulses or during the air scavenging air pulses or during substantially the whole of the overall pulses constituted by the oil mist and scavenging air pulses.

The other lubrication station 17*d*, shown in Figure 4, is associated with a wheel 43' which oscillates around a pivot 42 and which runs on an element 44 made of a foamed material. The oil mist pulse and the scavenging air pulse are supplied through the feed line 12*d* and go through the nozzle 9*d* to reach a surface 45 which is to be lubricated and which is the outer arcuate surface of the member 43'. The whole outside surface 45 is lubricated as it oscillates, so that its tip 46 is lubricated upon entering a slot in a picking projectile 50 to open the thread clamp thereof, whereafter the projectile can engage the weft thread to be picked.

In a variant of the lubricating method, a scavenging air pulse 43 shown in chain lines in Figure 2 is given before the oil mist pulse 23 in addition to or instead of the scavenging air pulse 24. In another variant, the suction pulse is simultaneous with and lasts as long as the oil mist pulse and scavenging air pulse combined.

In a variant of the lubricating system, instead of a compressor 1 being provided in

the picking motion 25 to provide an independent supply of compressed air, either a compressor 1', visible in Figure 1, associated with a number of looms can be connected via a line 12*f* or the system can be supplied through a line 12*g* from a common mains air system 1".

The suction pulses can operate through the same nozzles 9*a*, *b*, *c* as do the oil mist and scavenging air pulses.

WHAT WE CLAIM IS:

1. A method of lubricating a textile machine, the method comprising delivering in a programmed sequence at a lubricating station of the machine lubricant-mist pulses and gas pulses, the gas pulses being introduced into a supply line conveying the lubricant mist to the lubricating station, at a point downstream of a lubricant mister as considered in the direction of lubricant flow.

2. A method as claimed in Claim 1, in which each lubricant - mist pulse lasts longer than each gas pulse.

3. A method as claimed in Claim 1 or Claim 2, in which each lubricant-mist pulse is immediately preceded or is immediately succeeded by a gas pulse.

4. A method as claimed in Claim 3 in which each lubricant-mist pulse lasts four times as long as the immediately preceding or immediately succeeding gas pulse.

5. A method as claimed in any of the preceding Claims in which the pressure of each lubricant-mist pulse is lower than the pressure of each gas pulse.

6. A method as claimed in any of the preceding Claims in which there are pauses between consecutive lubricant-mist pulses.

7. A method as claimed in any of the preceding Claims in which suction pulses are produced in a programmed sequence at the lubricating station to remove the lubricant-mist or dirt.

8. A method as claimed in Claim 7 in which each suction pulse occurs at least partly during a lubricant-mist pulse.

9. A method as claimed in Claim 7 in which each suction pulse occurs at least partly during a gas pulse.

10. A method as claimed in Claim 7 when appendant to Claim 3, in which each suction pulse lasts substantially as long as an associated supply pulse comprising a lubricant-mist pulse and a gas pulse.

11. A method as claimed in any of Claims 7 to 10, in which the suction pulses are produced at the lubricating station by way of the same supply line as are the lubricant-mist pulses.

12. A method as claimed in any of Claims 7 to 10, in which the suction pulses are produced at the lubricating station by way of a suction passage separate from the supply line used for the lubricant-mist pulses.

13. A method as claimed in any of the preceding Claims in which the textile machine is a loom.

14. A method as claimed in any of the preceding Claims in which the gas is air.

15. A method of lubricating a textile machine substantially as described herein with reference to Figures 1 and 2 of the accompanying drawings.

16. A method as claimed in Claim 15, in which the textile machine is a loom having a picking motion constructed and arranged to operate as described in Figure 3 and/or having a projectile thread clamp opener constructed and arranged to operate as described in Figure 4 of the accompanying drawings.

17. A textile machine having a lubricating station, a lubricant-mist line leading from a lubricant mister to the lubricating station, a pressurised gas line leading into the lubricant-mist line at a point downstream of the lubricant mister as considered in the direction of lubricant flow, first and second flow control means controlling flow through the gas line and the lubricant-mist line respectively, and a program controller arranged to control the flow control means to deliver to the lubricating station lubricant-mist pulses and gas pulses in a programmed sequence.

18. A textile machine as claimed in Claim 17, which includes an extraction line leading from the lubricating station, and further flow control means controlling flow through the extraction line, the further flow control means being under the control of the program controller to produce suction pulses in sequence with the lubricant-mist pulses and the gas pulses.

19. A loom having a lubricating system substantially as described herein with reference to Figures 1 and 2 of the accompanying drawings.

20. A loom as claimed in Claim 19 which has a picking motion constructed and arranged to operate as described in Figure 3 and/or has a projectile thread clamp opener constructed and arranged to operate as described in Figure 4 of the accompanying drawings.

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1603055 COMPLETE SPECIFICATION

4 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 1

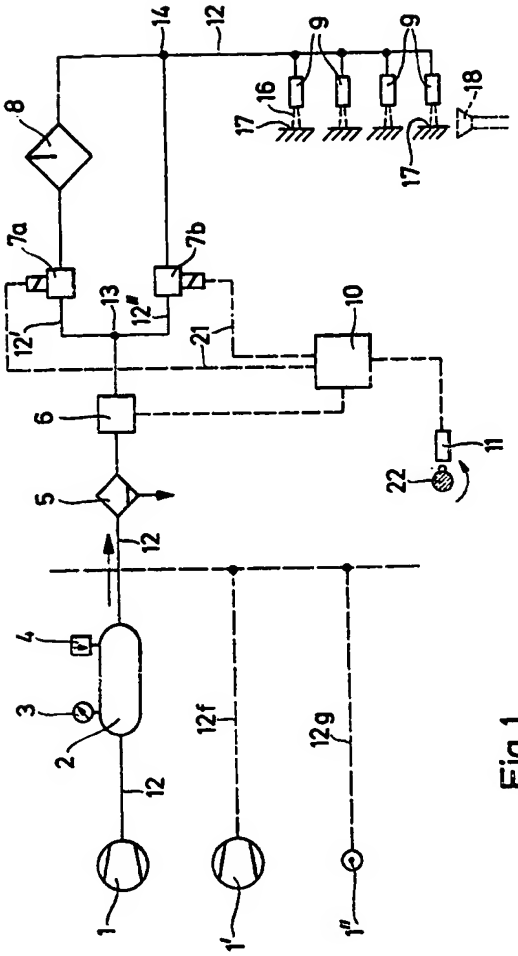


Fig.1

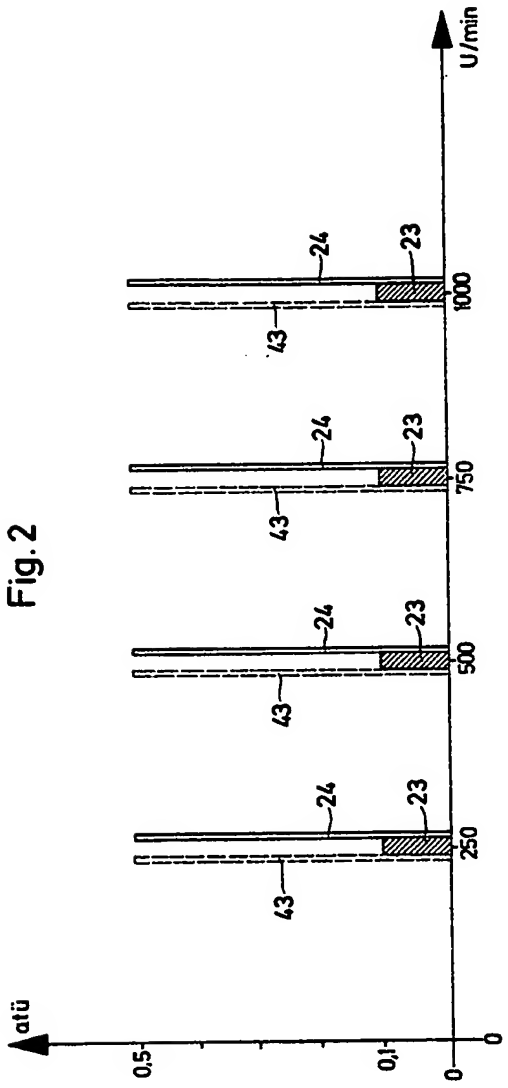


Fig. 2

1603055 COMPLETE SPECIFICATION

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Sheet 3

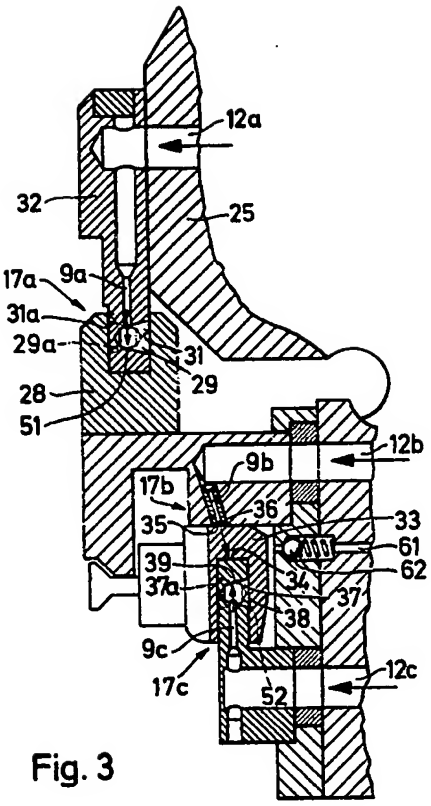


Fig. 3

1603055 COMPLETE SPECIFICATION

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Sheet 4

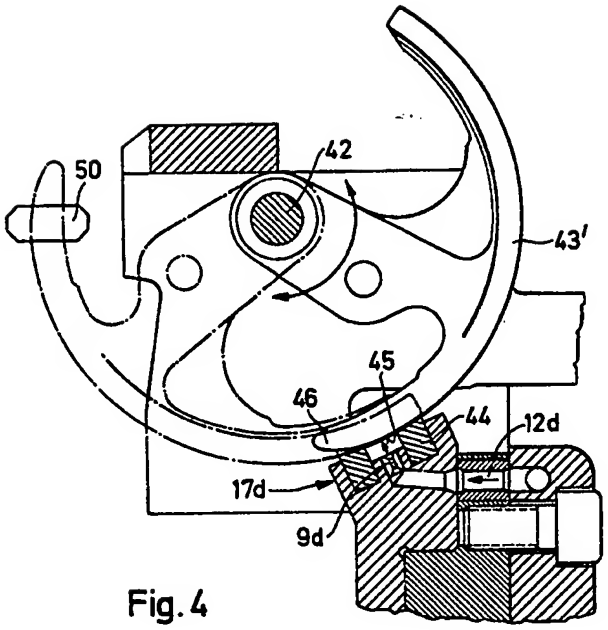


Fig. 4